

late inflorescences with 1–4-flowered cymose staminate branches or uniflorous pistillate branches, 4–5-merous flowers, small globose fruits and 4 striate esulcate pyrenes.

Branchlets nigrescent; third year's growth terete, 2.5 mm. in diameter, pubescent, the lenticels lacking, the leaf-scars horizontally linear, elevated; second year's growth 1.75 mm. in diameter, pubescent; current year's growth 1 mm. in diameter, longitudinally plicate, pubescent, the terminal buds conic, densely pubescent, usually poorly developed. Leaves occurring even on third year's growth, 4–9 mm. apart; stipules callose, deltoid, pubescent, persistent; petioles 4–5 mm. long, one-ninth to one-seventh the length of the lamina, pubescent, shallowly canaliculate; lamina coriaceous, olivaceous, slightly shiny above, opaque and punctate beneath, elliptic, obovate-elliptic or subrhomboidal, 2.5–4.5 cm. long, 1–2 cm. wide; base cuneate; apex shortly and abruptly produced, the very point retuse; margin entire; midrib deeply canaliculate and sparsely puberulous above, elevated and sparsely pubescent beneath, the lateral nerves 5–6 pairs, indistinct above, obscure beneath. Inflorescences fasciculate, pubescent, axillary, on last year's growth. Staminate inflorescences: individual branches of the fascicles 3-flowered, cymose, rarely uniflorous, the bracts ovate, pubescent; peduncles 3–5 mm. long, the pedicels 2–3 mm. long, angular, the bracteoles minute, pubescent, the pedicels of the uniflorous branches 3–4 mm. long, with 2 sub-basal prophylla; flowers white, 4- or 5-merous; calyx patelliform, 2 mm. across, pubescent and ciliate, shallowly 4- or 5-lobed, the lobes deltoid, obtuse; corolla rotate, 5 mm. across, the petals ovate, 2 mm. long, eciliate, one-fifth connate at the base; stamens 4, rarely 5, shorter than the petals, the anthers oblong; rudimentary ovary subglobose, the middle rounded and inconspicuously lobed or slightly produced. Pistillate flowers not seen. Infructescences fasciculate, the individual branches of the fascicles uniflorous, the pedicels 5 mm. long with 2 submedian prophylla. Fruit globose, 5 mm. in diameter, the persistent calyx explanate, 3 mm. wide, pubescent and ciliate, the stigma thin-discoid, slightly elevated. Pyrenes 4, oblong in outline, 3–3.5 mm. long, 2 mm. wide, reticulately striate on the back and sides, the striae elevated, easily detached from the smooth coriaceous endocarp.

CHINA: Kwangtung: Tseng-shing, Naam-kwan-shan, *W. T. Tsang* 20159 (A), 20220 (A). Kwangsi: Shang-sze, Shap-man-tai-shan, *W. T. Tsang* 22688 (TYPE, A).

The description of the staminate flower is drawn from *Tsang* 20220.

This species is endemic to the high mountains bordering Kwangtung and Kwangsi provinces. There it grows as a tree in mixed forests, where the white flowers appear in April or May and the fruit becomes yellow in July.

The punctate leaves and the fasciculate inflorescences of this species suggest a close relationship with *Ilex tutcheri* Merr., but this latter species has obovate thick-coriaceous leaves with rounded and retuse or emarginate apices. The small retuse leaves of *Ilex buxoides* simulate those of *Ilex*

lohfaensis, but in the latter species the leaves are epunctate and the fruit has very short pedicels.

100. *Ilex kengii*, sp. nov.

Arbor glaberrima; foliis tenuiter coriaceis, integerrimis, subtus punctatis, ellipticis vel ovato-ellipticis, 4.5–11 cm. longis, 2–5 cm. latis, basi obtusis, apice acuminatis, acuminibus 10–15 mm. longis, obtusis vel mucronatis, costa supra subtusque elevata, nervis lateralibus prominentibus; inflorescentiis pseudofasciculatis, singulis ♀ 1–5-floris, pedunculis 3–8 mm. longis, pedicellis 4–5 mm. longis; floribus 4–6-meris; calycibus ciliatis, 4- or 5-, raro 6-lobatis; fructibus globosis, 3 mm. diametro; pyrenis 4, coriaceis, 2.8 mm. longis, 1.5 mm. latis, 5- or 6-striatis.

An evergreen tree up to 10–12 m. high with glabrous branchlets, thin-coriaceous elliptic entire leaves with an acuminate apex, pseudofasciculate inflorescences, cymose 3-flowered individual branches of pistillate fascicles, small globose fruits and 3 striate esulcate pyrenes.

Branchlets glabrous, olivaceous-brunneous or olivaceous-cinereous; third year's growth 3 mm. in diameter, longitudinally rimulose, the lenticels numerous, circular, conspicuous, the leaf-scars semi-orbicular, slightly elevated; second year's growth 1.8 mm. in diameter, the lenticels lacking; current year's growth 1 mm. in diameter, longitudinally ridged and canaliculate, the terminal buds acutely conic, glabrous, the scales ciliate. Leaves occurring even on the third year's growth, 8–15 cm. apart; stipules short, broadly deltoid, callose; petioles 7–13 mm. long, one-sixth to one-fifth as long as the lamina, glabrous, narrowly and deeply canaliculate above, rugose beneath; lamina thin-coriaceous, olivaceous, opaque on both surfaces, punctate beneath, elliptic or ovate-elliptic, 4.5–11 cm. long, 2–5 cm. wide; base obtuse; apex acuminate, the acumen 10–15 mm. long, the tip obtuse or mucronate; margin entire; midrib elevated on both surfaces, the lateral nerves 6–8 on each side, evident or rarely obscure above, prominent beneath, reticulate near the margin, the reticulation of the veinlets obscure. No flowers seen. Infructescences pseudofasciculate, axillary, on second year's growth, the fascicles with active or abortive terminal buds, the central axis 2–8 mm. long; bracts minute, the lower ones tricuspidate, the upper ones lanceolate with stipule-like appendages, ciliate; individual branches 1–5-flowered, when uniflorous pedicels 3–6 mm. long, glabrous or very rarely minutely puberulous at the base, prophylla 2, glabrous, submedian, when multiflorous cymose or umbelliform; peduncles 3–8 mm. long, the pedicels 4–5 mm. long, glabrous; flowers 4-merous; calyx (after fruiting) subexplanate-patelliform, 2 mm. across, orbicular in outline, shallowly 4-lobed, the lobes rounded, ciliate. Fruit small, globose, 3 mm. in diameter, when dry brunneous or cinereous, smooth, the stigma thick-discoid. Pyrenes 4, broadly elliptic in outline, the ends pointed, 2.8 mm. long, 1.5 mm. wide, 5–6-striate and esulcate on the back, the striae easily detached from the smooth coriaceous endocarp.

CHINA: Chekiang: Tai-pai-shan, *Y. L. Keng* 1132 (A), 1175 (TYPE, A). Kweichow: Tu-shan, *Y. Tsiang* 6636 (NY), 7063 (NY). Kwangsi: Yao-shan, *C. Wang* 40304 (A).

Ilex kengii has been collected in Chekiang, Kweichow, and Kwangsi provinces. All the specimens examined were in fruit. The texture and shape of the leaves, the nature of the infructescence, the size of the fruit, and the pyrene characters all agree. The plant grows to be a tree 10–12 m. high in woods or mixed forests at altitudes of 250–800 m., where the fruits turn red in November.

The acuminate entire leaves, small fruit, and 4 striate and esulcate pyrenes of *Ilex kengii* suggest a close relationship with *Ilex wilsonii* Loes. which differs in having epunctate leaves and uniflorous individual branches of the pistillate fascicles. The punctate leaves and small fruit of the species under discussion also suggest relationship with *Ilex longicaudata* Comber, which differs in having caudate leaves with an apex and uniflorous individual branches of the pistillate fascicles.

101. *Ilex longicaudata* Comber in Notes Bot. Gard. Edinb. 18: 54. 1933.

An evergreen tree up to 9 m. high with entire caudate punctate elliptic or ovate-elliptic leaves, small globose fruits in fascicles, and smooth 3-striate esulcate pyrenes with coriaceous endocarp.

Branchlets slender, when dry cinereous or light brown; third year's growth 2.7–3 mm. in diameter, the lenticels sparse, circular, the leaf-scars narrowly crescent-shaped, often accompanied by persistent stipules; second year's growth with evident lenticels; current year's growth very slender, ca. 1.25 mm. in diameter, somewhat plicate-sulcate, puberulent in the groove, the terminal bud puberulent, with ciliate scales. Leaves occurring also on the second year's growth, 10–12 mm. apart; stipules deltoid, subulate and slightly falcate, persistent; petioles slender, 6–12 mm. long, one-twelfth to one-seventh as long as the lamina, canaliculate and puberulent above, plicate and keeled beneath; lamina coriaceous, olivaceous, slightly shiny or opaque above, paler and opaque and punctate beneath, ovate-elliptic or elliptic, 4–9 cm. long, 1–2.6 cm. wide; base obtuse or rounded; apex usually narrowly caudate, the acumen 7–20 mm. long, the tip cuspidate; midrib impressed and puberulent above (plane when young), elevated beneath, the lateral nerves 7 or 8 on each side, obscure or even evident beneath. Staminate inflorescences: pseudo-paniculate, axillary on second year's growth, the central axis 4–15 mm. long, puberulent, some panicles with 2 or 3 leaves at the apical end, the bracts thickly coriaceous, sparsely and minutely puberulent and ciliate, oblong-ovate, acute; individual branches 3-flowered, cymose, rarely uniflorous; peduncles 4 mm. long, the pedicels 2 mm. long, with 0–2 minute basal prophylla; flowers 4- or 5-merous; calyx patelliform, 2.5 mm. across, 4-lobed, the lobes large, often erose or parted, obtuse, very sparsely ciliate; corolla rotate, the petals obovate, one-sixth connate at the base; stamens slightly shorter than the petals, the anthers 4, ovate-oblong; rudimentary ovary subglobose, the apical end truncate, 4-sulcate. Pistillate inflorescences: fasciculate or pseudoracemose, axillary, on second year's growth, very puberulent, pedicels 2–3 mm. long; calyx 4- or 5- (rarely 6)

-merous, explanate after fruiting, 3 mm. across, the lobes deltoid, acute, ciliate; corolla erect, the petals ovate, 2 mm. long, 1 mm. wide; staminode three-fourths the length of the petals, the sterile anthers ovoid; ovary large, subglobose, 2 mm. in diameter, the stigma thick-discoid, convex. Fruit small, globose, 3–4 mm. in diameter, the stigma subcolumnar or discoid, much elevated, the style evident. Pyrenes 5, elliptic in outline, smooth, 3-striate and esulcate on the back, 2.5 mm. long, 1.25 mm. wide, the endocarp coriaceous.

CHINA: Yunnan: *G. Forrest* 1565 (ISOTYPE, A); Shang-pa, *H. T. Tsai* 54384 (A), 54458 (A), 55918 (A), 56581 (A), 59119 (A); Ping-pien-hsien, *H. T. Tsai* 60494 (A), 61074 (A), 61957 (A), Shun-ning, *T. T. Yu* 16678 (material for the description of fruit, A); Keng-ma, *T. T. Yu* 17274 (material upon which the description of the pistillate flower was drawn, A).

This species is endemic to Yunnan Province, where it grows as a tree at altitudes of 1400–2700 m. The flowers appear in July and the fruit turns red in October.

The cymose staminate inflorescences, the smooth 3-striate and esulcate pyrenes with coriaceous endocarp, and the punctate leaves of this species indicate that it is closely related to *Ilex crenata* Thunb. and *Ilex triflora* Bl. The long caudate leaves distinguish it readily from these two latter species. Its leaves resemble those of *Ilex embelioides* Hook. f. In the last-mentioned species, the leaves are epunctate.

When Comber described the species he wrote, "Frutex 2–3 m. altus, ramulis gracilibus glabris. . . ." The isotype in the Arnold Arboretum and the additional materials collected from Yunnan all have more or less pubescent terminal buds, stems, petioles, midribs (above), rachis, and pedicels. Furthermore, "a tree, 30 ft. high, 1 ft. in diameter" has been reported by *H. T. Tsai* (56581). Besides these changes, a description of the pistillate flowers, the fruits and the pyrenes is added.

101a. *Ilex longicaudata* var. *glabra*, var. nov.

Frutex glaber; foliis ovato-ellipticis vel ellipticis, crasse coriaceis, basi obtusis, apice caudatis, costa supra puberulentibus, nervis lateralibus obscuris; fructibus parvis, globosis, stigmatate prominente, stylo evidente, calycibus persistentibus 2 mm. diametro, glabris, rugosis, ciliatis; pyrenis 4, 3-striatis, esulcatis, endocarpio coriaceo.

This variety differs from the typical species in having thickly coriaceous leaves with the lateral nerves obscure on both surfaces, glabrous stem and pedicels, small calyx, and prominent stigma with short style.

CHINA: Yunnan: Ping-pien-hsien, *H. T. Tsai* 61730 (TYPE, A).

Like the species, this variety is endemic to Yunnan Province, where it grows in woods as a shrub at an altitude of 1400 m.

I have dissected seven fruits and found that each possess four pyrenes. The fruiting material of the species has five pyrenes. Additional specimens of flowering material may prove this variety worthy of specific status.

102. *Ilex liangii*, sp. nov.

Ilex hanceana sensu Merr. & Chun in Sunyats. 2: 26. 1934; Tanaka &

Odashima in Jour. Soc. Trop. Agric. **10**: 372. 1938; Masamune, Fl. Kainant. (Hainan) 174. 1943, non Maxim.

Frutex glaberrimus; foliis coriaceis, oblongo-ellipticis, 2–5 cm. longis, 1–2.4 cm. latis, basi obtusis usque acuminatis, apice obtusis, rotundatis vel raro retusis, integerrimis, costa supra impressa, glaberrima, nervis lateralibus utrinque 4–5; inflorescentiis paucifasciculatis, singulis ♂ 3-floris, pedunculis 3–4 mm. longis, pedicellis 1 mm. longis; floribus 4-meris, calycibus 2 mm. diametro, ciliatis, corolla 5 mm. diametro, petalis ovatis, eciliatis; fructibus globosis, 4 mm. diametro, pedicellis 4 mm. longis, glaberrimis, stylo prominente, stigmatate capitato; pyrenis 4.

An entirely glabrous evergreen shrub up to 3 m. high with glabrous branchlets, oblong-elliptic entire epunctate leaves, obtuse with a rounded or sometimes slightly retuse apex, paucifasciculate inflorescences, 4-merous flowers, and styliferous ovaries.

Branchlets slender, olivaceous-cinereous when dry; third year's growth 2 mm. in diameter, the lenticels lacking, the leaf-scars semi-orbicular, elevated; second year's growth 1.5 mm. in diameter, plicate-rugose; current year's growth 1.25 mm. in diameter, longitudinally ridged, the terminal buds poorly developed, when present rounded, glabrous. Leaves occurring even on the fourth year's growth, 3–7 mm. apart; stipules deltoid, acute, often obscure; petioles 4–5 mm. long, one-eighth to one-seventh as long as the lamina, shallowly canaliculate, glabrous; lamina coriaceous, light olivaceous, slightly shiny above, opaque and epunctate beneath, oblong-elliptic, 2–5 cm. long, 1–2.4 cm. wide; base obtuse or cuneate; apex obtuse, rounded or occasionally retuse; margin entire; midrib impressed above, elevated beneath, both glabrous; the lateral nerves 4 or 5 on each side, obscure above, obscure or prominent beneath, the reticulation of the veinlets sometimes evident beneath. Inflorescences paucifasciculate on second year's growth or solitary at the base of the current year's growth. Staminate inflorescences: individual branches of the fascicles 3-flowered, the peduncles 3–4 mm. long, the pedicels 1 mm. long; flower 4-merous; calyx 2 mm. across, glabrous and rugose, deeply 4-lobed, the lobes obtuse or rounded, erose, ciliate; corolla rotate, 5 mm. across, the petals 2 mm. long, obovate, eciliate, slightly connate at the base; stamens two-thirds as long as the petals; rudimentary ovary subglobose-ovoid, papillose, abruptly and shortly rostellate. Pistillate flowers not seen. Infructescences fasciculate, the fruiting pedicels 3–5 mm. long with 2 supermedian prophylla. Fruit globose, 5 mm. in diameter, the persistent calyx rugose, 2.5 mm. across, explanate, 4-lobed, the lobes deltoid or rounded, ciliate, the style evident, the stigma capitate. Pyrenes 4, broad-elliptic in outline, 3.75 mm. long, 2.25 mm. wide, the back 3- or 4-striate, esulcate, the striae elevated, clinging to the coriaceous endocarp.

CHINA: Hainan: Mo-chong Mt., Ting-an, S. P. Ko 52268 (A); without precise locality, H. Y. Liang 64391 (TYPE, A); C. Wang 35963 (A, US), 35990 (US).

Ilex liangii is endemic to Hainan Island, where it grows as a shrub in woods. The white flowers appear in December.

The glabrous branchlets, small epunctate leaves, the styliferous ovary, and the capitate stigma of *Ilex liangiana* indicate close relationship between this species and *Ilex memecylifolia* Champ., but the latter differs in having longer fruiting pedicels, abruptly acuminate apices, obscure lateral nerves, and leaves turning griseous or brunneous-olivaceous in drying.

The description of the staminate flower is drawn from *Wang 35963*.

103. *Ilex goshiensis* Hayata in Jour. Coll. Sci. Tokyo 30: 54. 1911, et Ic. Pl. Form. 1: 131. 1911.

Ilex hanceana Maxim. forma *rotundata* Makino ex Yamamoto in Suppl. Ic. Pl. Form. 1: 34. 1925. *Syn. nov.*

Ilex hanceana sensu Hayata Ic. Pl. Form. 3: 54. 1913, non Maxim.

An evergreen shrub or small tree up to 6 m. high with puberulous branchlets, suborbicular or broadly elliptic entire leaves with a shortly produced (often retuse) apex, fasciculate inflorescences, umbelliform (3-7-flowered) individual staminate branches, cymose 1-3-flowered pistillate branches, small globose fruits, elevated 4-lobed stigmas, and 4 minute striate pyrenes.

Branchlets slender, brunneous or nigrescent when dry; third year's growth 2.5 mm. in diameter, rugose, the leaf-scars semi-orbicular, elevated, the lenticels inconspicuous; second year's growth 2 mm. in diameter, longitudinally plicate-rugose, puberulous; current year's growth 1.5 mm. in diameter, ridged, puberulous, rarely glabrescent; the terminal buds small, conic, puberulous, often abortive. Leaves occurring also on second year's growth, 2-7 mm. apart; stipules callose, deltoid, acute, puberulous; sometimes obscure; petioles 4-8 mm. long, one-fifth to one-fourth the length of the lamina, puberulous, broadly and shallowly canaliculate above; lamina coriaceous, brunneous-olivaceous, opaque on both surfaces or slightly shiny above, suborbicular or broadly elliptic, 2.8-4.8 cm. long, 1.5-2.5 cm. wide; base acute; apex shortly and abruptly acuminate, the acumen 2.5 mm. long, the tip retuse or obtuse; margin entire; midrib plane and sparsely puberulous above, slightly elevated and glabrous beneath, the lateral nerves 4-6 on each side, obscure on both surfaces, the reticulation of the veinlets obscure. Inflorescences fasciculate, axillary, rarely basal on current year's growth, then solitary to scales, puberulous or rarely glabrescent. Staminate inflorescences: individual branches of the fascicles 3-7-flowered, umbelliform, the bracts tricuspidate, puberulous; peduncles 4-5 mm. long, the bracteoles minute, callose, puberulous, the pedicels 2-3 mm. long; flowers 4- or 5-merous; calyx patelliform, 2 mm. across, puberulous, shallowly 4-(rarely 5)-lobed, the lobes rounded, densely ciliate; corolla rotate, 4-5 mm. across, the petals 4, rarely 5, oblong, 1.75 mm. long, eciliate, one-eighth connate at the base; stamens slightly shorter than the petals, the anthers oblong; rudimentary ovary subglobose, the apex rounded and slightly depressed. Pistillate flowers not seen. Infructescences fasciculate, the individual branches of the fascicles uniflorous, rarely 3-flowered, the pedicels 3-5 mm. long, when 3-flowered, the peduncles 5 mm. long, the pedicels 2.5 mm. long. Fruits globose,

4 mm. in diameter, the stigma discoid, slightly elevated, distinctly 4-lobed, the persistent calyx explanate, 2.5 mm. across, 4- or 5-lobed, ciliate. Pyrenes 4, suborbicular in outline, 1.75–2 mm. long, 1.25–1.8 mm. wide, the back 3-striate, esulcate, the striae elevated, clinging to the smooth coriaceous endocarp.

CHINA: Taiwan: Mt. Goshizan, *T. Kawakami 1258A* (photo of TYPE, A), *1258B* (photo and fragment, A). Hainan: Po-ting, *F. C. How 73624* (A).

LIU-KIU: Iriomote Island, *J. L. Gressitt 600* (A); Kundjan, *J. Matsumura* in 1897 (A); Okinawa, *T. Tiyagi* (A); Genka Mt., *E. H. Wilson 8091* (A).

JAPAN: Honshu: Prov. Ise, Uji-yamada, *H. Hara 2434A* (A).

Ilex goshiensis was first described from Taiwan and Liu-kiu. When Hayata prepared the description he was uncertain about the identity of the Liu-kiu material because of its fasciculated umbelliform inflorescences. Thus he recorded the description of the Liu-kiu specimen in his notes only. In fact, the fasciculate umbelliform staminate inflorescence is a common character in the series *Sideroxyloides*.

In Taiwan and Liu-kiu the plant growth to be a large shrub or small tree up to 6 m. high with a trunk 12 cm. in diameter. In Hainan it has been reported growing in forests as a tree up to 12 m. high. In Liu-kiu the fruit turns red in August and persists on the tree until the following March. In Hainan the fruit is still greenish-yellow in September, and the slightly elevated stigma has a peculiar halo-like ring surrounding it.

Ilex goshiensis is closely related to *Ilex oligodonta* Merr. & Chun, but the latter has leaves with long-acuminate apices, and its infructescences possess only uniflorous branches. It is also closely related to *Ilex wilsonii* Loes., but the latter differs in being completely glabrous and in having long-acuminate leaves and 4-merous flowers.

Hayata described the species in 1911 and reduced it to *Ilex hanceana* in 1913. Through the help of Professor Merrill and the courtesy of Dr. H. Hara I have had access to some very well prepared photographs and fragments of the type and many other misidentified Liu-kiu plants. After comparing them with the continental material, I decided that the insular specimens represent a distinct species, which can easily be distinguished by the broadly elliptic or suborbicular leaves with very shortly and abruptly acuminate apices which, in turn, are usually retuse.

The description of the staminate flowers is drawn from Matsumura's collection.

104. *Ilex hayataiana* Loes. in Fedde, Rep. Spec. Nov. 55: 333. 1941.

Ilex hanceana sensu Kanehira, Form. Trees 131. 1917, et. 372, 1936, non Maxim.

A bushy or large evergreen tree up to 12 m. high with puberulent branchlets, entire elliptic or broad-elliptic leaves in which the apex is acuminate, fasciculate inflorescences, and 4 striate-esulcate pyrenes.

Branchlets subterete, cinereous when dry; third year's growth 4 mm. in

diameter, rugose with numerous large elevated lenticels and leaf-scars; second year's growth 2.5 mm. in diameter, longitudinally plicate-rugose, puberulous, the lenticels conspicuous; current year's growth 1.5–2 mm. in diameter, longitudinally ridged and canaliculate, pubescent, the terminal buds conic, acute, puberulous. Leaves occurring even on the third year's growth, 5–20 mm. apart; stipules narrowly deltoid, acute; petioles 4–7 mm. long, one-eighth to one-sixth the length of the lamina, pubescent, shallowly canaliculate above, narrowly winged by the decurrent leaf-base on the distal half; lamina coriaceous, olivaceous, opaque on both surfaces, elliptic or ovate-elliptic, 2–5 cm. long, 1–2 cm. wide; base obtuse or acute; apex acuminate, the acumen 5–10 mm. long, the tip obtuse or mucronate; margin entire; midrib elevated and pubescent above, elevated below, the lateral nerves 7–8 pairs, obscure on both surfaces. Infructescences fasciculate or pseudo-fasciculate, axillary, on the second year's growth, the central axis up to 4 mm. long, with abortive terminal buds; bracts narrowly deltoid, 1 mm. long, pubescent; individual branches of the pistillate fascicles uniflorous; pedicels 5–7 mm. long, striate-sulcate, pubescent, with 2 median prophylla; flowers 4-merous; calyx (after fruiting) subexplanate patelliform, 2 mm. across, quadrangular in outline, 4-lobed, the lobes rounded, ciliate. Fruit subglobose, 4 mm. in diameter, the stigma capitate. Pyrenes 4, elliptic in outline, convex on the back, the ends pointed, 4 mm. long, 1.5–2 mm. wide on the back, 3-striate, esulcate on the back, the striae elevated and clinging to the smooth coriaceous endocarp.

FORMOSA: Noko, *Y. Simada* 46 (A); Kagi, *E. H. Wilson* 9780 (ISOTYPE, A); Nanato, *E. H. Wilson* 10039 (ISOTYPE, A); Giran, *E. H. Wilson* 10172 (A).

LIU-KIU ISLANDS: Okinawa Island, *J. T. Conover* 1139 (A).

Ilex hayataiana is an insular species, first recorded from Taiwan. It grows as a tree in forests at altitudes of 2300–3000 m. The bark is grayish black. The flowers appear in the summer and the fruits become red in February.

Ilex hayataiana is closely related to *Ilex wilsonii* Loes., but the latter species differs in having larger leaves, which are shiny brown on the upper surface, and glabrous branchlets. In the small leaves it bears some similarity to *Ilex hanceana* Maxim., but the latter species has very short fruiting pedicels (only 1–3 mm. long). From *Ilex memecylyfolia* Champ. ex Benth. it differs in the thinner leaves and capitate stigma.

105. *Ilex oligodonta* Merr. & Chun in *Sunyats.* 1: 67. 1930; H. H. Hu & Chun in *Ic. Pl. Sin.* 4: 19. 1935.

Ilex wilsonii sensu Merr. in *Lingnan Sci. Jour.* 13: 37. 1934, in parte, non Loes.

A puberulous evergreen shrub up to 2 m. high with slender branchlets, coriaceous entire (sometimes 1 or 2 bristly-toothed) oblong-lanceolate or oblong-elliptic leaves with subcordate apices, fasciculate, pseudopaniculate or solitary cymose inflorescences.

Branchlets rather slender, the old growth terete, cinereous, ochraceous, the lenticels numerous and conspicuous, third year's growth 2 mm. in diameter, puberulous, the leaf-scars elevated, the lenticels lacking; second year's growth 1.25 mm. in diameter, longitudinally canaliculate, puberulous; current year's growth angular, 1 mm. in diameter, puberulous. Leaves occurring even on the fourth year's growth, 7-12 mm. apart; stipules minute, deltoid, acute, puberulous; petioles 3-6 mm. long, one twenty-second to one-ninth the length of the lamina, puberulous all over, shallowly canaliculate at the distal ends; lamina coriaceous or thickly coriaceous, brunneous-olivaceous, opaque on both surfaces or slightly shiny above, minutely puberulous above or so only on the midribs, puberulous or glabrescent beneath, oblong-elliptic or oblong-lanceolate, 3-7.5 cm. long, 1-2 cm. wide; base obtuse; apex gradually acuminate, the acumen 7-15 mm. long, the very end mucronate; margin normally entire, under adverse conditions with 1 or 2 bristly teeth at the apical end; midrib plane and puberulous above, slightly elevated and glabrous or puberulous below, the lateral nerves 5-7 pairs, obscure on both surfaces. Inflorescences essentially fasciculate with active or abortive terminal buds, in the former case the individual branch solitary in the axils of the scales or leaves, puberulous. Staminate inflorescences: individual branches of the fascicles 3-7-flowered, cymose; peduncles 3-6 mm. long, the secondary axis sometimes well developed, 1-2 mm. long, the pedicels 1-3 mm. long, with 1 or 2 basal prophylla; flowers 4-merous; calyx patelliform, puberulous, shallowly 4-lobed, the lobes rounded, erose and ciliate; corolla rotate, 5 mm. across, the petals ovate-oblong, ca. 2 mm. long, eciliate, one-fourth connate at the base; stamens equaling the petals in length, anthers oblong, 1 mm. long; rudimentary ovary pulvinate, shortly rostellate. Pistillate inflorescences: individual branches of the fascicles uniflorous; calyx and corolla as in the staminate flowers; staminodes two-thirds the length of the petals, the sterile anthers sagittate, with the truncate apex glabrous; ovary ovoid, 1.8 mm. long, 1.5 mm. wide, the stigma discoid, convex, 4-lobed.

CHINA: Kwangtung: Tsung-fa (Tsung-hwa), *W. T. Tsang* 20430 (A, US), 25122 (A); Lok-chong, *C. L. Tso* 20684 (TYPE, NY; fragment and photo, A).

The description of the pistillate flower is drawn from *Tsang* 25122.

Ilex oligodonta is isolated in the high mountains of northern Kwangtung. Its white and fragrant flowers appear in May. The few specimens which we have are poor.

The fasciculate cymose inflorescences and the coriaceous leaves of *Ilex oligodonta* suggest close relationship between this species and *Ilex wilsonii* Loes., but the latter differs in having glabrous branchlets, inflorescences, and midribs, ovate-oblong leaves with an abruptly acuminate apex, and non-rostellate rudimentary ovary. The species is also closely related to *Ilex fukienensis* S. Y. Hu, but the latter has much larger leaves (up to 10 cm. long, 3-5 cm. wide), glabrous branchlets, and deeply canaliculate midribs.

The type collection is apparently made from an old and dying bush, for the branchlets are slender and short, and many of them have neither leaves nor buds. *W. T. Tsang 20430* and *25122* match the type in leaf-form and in indumentum. They both have fasciculate inflorescences as well as solitary axillary cymes on the current year's growth.

106. *Ilex wilsonii* Loes. in Nov. Act. Acad. Caes. Leop.-Carol. Nat. Cur. 89: 287 (Monog. Aquif. 2: 287). 1908, et in Sarg. Pl. Wils. 1: 80. 1911; Chien, in Contr. Biol. Sci. Soc. China 3(1): 59. 1927; Rehd. in Jour. Arnold Arb. 8: 157. 1927; Hand.-Mzt. Symb. Sin. 7: 657. 1933; Merr. in Lingnan Sci. Jour. 13: 37. 1934.

Ilex memecylifolia Champ. ex Benth. var. *plana* Loes. l. c. (1908). *Syn. nov.*

An entirely glabrous tree up to 10 m. high with ovate- or obovate-oblong entire leaves, caudate apices, fasciculate inflorescences, cymose or umbelliform individual branches of staminate fascicles, uniflorous individual branches of pistillate fascicles, small subglobose fruit, discoid stigma, and 4 striate-esulcate pyrenes.

Branchlets subterete, cinereous-brunneous, rarely castaneous; third year's growth 3 mm. in diameter, smooth, the lenticels lacking, the leaf-scars semi-orbicular, slightly elevated; second year's growth 2 mm. in diameter, longitudinally plicate-rugose; current year's growth angular, 1.5–1.75 mm. in diameter, glabrescent, the terminal buds thinly conic, glabrous, the scales ciliate. Leaves occurring even on the third year's growth, 8–20 mm. apart; stipules deltoid, acute; petioles 5–9 mm. long, one-eighth to one-seventh the length of the lamina, glabrous, deeply canaliculate above, plicate-rugose beneath; lamina thickly coriaceous, olivaceous-brunneous, shiny above, opaque beneath, ovate or obovate-oblong, 3–6.5 cm. long, 1.5–3.5 cm. wide; base obtuse or rounded; apex abruptly acuminate-caudate, the acumen 6–8 mm. long, the tip obtuse; margin entire; midrib plane above, elevated beneath, the lateral nerves 7 or 8 on each side, obscure on both surfaces. Inflorescences fasciculate, axillary, on second year's growth, with abortive or rarely active terminal buds, the bracts deltoid, often tricuspidate; flowers 4-merous. Staminate inflorescences: individual branches of the fascicles 3–5-flowered, cymose or umbelliform; peduncles 3–8 mm. long, the pedicels 1–1.5 mm. long, glabrous, with 0–2 basal prophylla; calyx patelliform, 1.5 mm. across, the lobes deltoid, obtuse, ciliate; corolla rotate, 4–5 mm. across, the petals oblong, eciliate, one-fifth connate at the base; stamens shorter than the petals, the anthers oblong; rudimentary ovary subglobose-conic, the apex inconspicuously lobed. Pistillate inflorescences: individual branches of the fascicles uniflorous; pedicels 4–7 mm. long, glabrous, with 2 submedian prophylla; calyx and corolla as in the staminate flowers; staminodes one-half as long as the petals, the sterile anthers cordate; ovary ovoid, 1.5 mm. long, the stigma thickly discoid, sparsely puberulous. Fruit small, globose, smooth, 4 mm. in diameter, the persistent calyx sub-explanate-patelliform, 2.5 mm. across, orbicular in outline, shallowly

4-lobed, the lobes ciliate, the stigma thickly discoid. Pyrenes 4, ovoid-trigonous in outline, 3 mm. long, 1.5 mm. wide on the back, 3-striate, esulcate on the back, the endocarp coriaceous.

CHINA: Chekiang: Sia-chu, *R. C. Ching* 1624 (A, LU, SS, US), 1746 (A), 1748 (A, LU, NY, US), 2494 (A, SS, US). Anhwei: Whong-shan, *W. C. Cheng* 3972 (US); *R. C. Ching* 2974 (A, US); *N. K. Ip* 1610 (A). Kiangsi: Kuling, *E. H. Wilson* 1610 (US). Hupei (Hupeh): *E. H. Wilson* (Veitch Exp.) 2101 (ISOTYPES of *Ilex memecylofolia* var. *plana* (A, K, NY, US), 2101A (fruiting specimen, TYPE, A; K, US). Hunan: Yun-shan, *Handel-Mazzetti* 12063 (A, LU, US), 12124 (A). Kweichow: Shih-t sien, *Y. Tsiang* 4176 (NY). Szechuan: Mt. Omei, *H. C. Chow* 12370 (A); Opian-hsien, *T. S. Chao* 313 (SS); Tchen-kéou-tin, *R. P. Farges* (A); Yung-ching, Mt. Wa-wu, *C. W. Yao* 2072 (SS); without precise locality, *M. Chen* 1110 (in Herb. Department Forestry, Central University, Nanking). Taiwan: *N. Fukuyama* in 1938 (TU).

Ilex wilsonii was first recorded from western Hupei as a glabrous shrub. Additional material shows that it is a widely spreading species along the Yangtze River from Szechuan southeast to the coastal provinces of Anhwei and Chekiang. It has been reported as a tree up to 10 m. high in Chekiang. The flowers appear in May and by August the fruits become red.

The coriaceous entire leaves with the short-acuminate apex and the fasciculate inflorescences of *Ilex wilsonii* suggest a close relationship between this species and *Ilex kobuskiana* S. Y. Hu, but the latter has 6-8-merous flowers, a navel-like stigma, puberulous short pedicels, and larger leaves.

107. *Ilex fukienensis*, sp. nov.

Frutex glaberrimus; foliis coriaceis, epunctatis, integerrimis, ovato-oblongis vel raro ovato-lanceolatis, 5.5-10 cm. longis, 1.5-3.5 cm. latis, basi rotundatis vel raro obtusis, apice caudato-acuminatis, acuminibus 8-15 mm. longis, costa supra impressa, subtus elevata, nervis lateralibus supra et subtus evidentibus; inflorescentiis fasciculatis, ramulis singulis ♂ 1-7-floris, pedunculis 3-5 mm. longis, pedicellis 2-3 mm. longis; ramulis singulis ♀ unifloris, pedicellis 5 mm. longis; floribus 4-meris, calycibus patelliformibus, ciliatis; corolla rotata, petalis 1/10 connatis, 2 mm. longis; staminibus cum petalis subaequilongis, staminodiis 1/3 brevioribus; ovario subgloboso, stigmatate elevato, 4-lobo.

An entirely glabrous evergreen shrub up to 4 m. high with ovate-oblong or ovate-lanceolate caudate leaves, evident lateral nerves on both surfaces and fasciculate inflorescences.

Branchlets subterete, glabrous; third year's growth 3 mm. in diameter, cinereous, minutely rimulose, the lenticels lacking; second year's growth castaneous, plicate-rugose; current year's growth 1.5 mm. in diameter, ridged and sulcate, the terminal buds thinly conic, glabrous. Leaves occurring even on fourth year's growth, 6-15 mm. apart; stipules acute-deltoid, persistent; petioles 5-8 mm. long, one-twelfth to one-ninth the length of the lamina, glabrous, shallowly canaliculate near the base, the

distal half winged by the decurrent leaf-base; lamina coriaceous, bruneous-olivaceous, opaque on both surfaces, ovate-oblong or rarely ovate-lanceolate, 5.5–10 cm. long, 1.5–3.5 cm. wide; base rounded or rarely obtuse; apex caudately acuminate, the acumen 8–15 mm. long; margin entire; midrib deeply impressed above, elevated beneath, the lateral nerves 9 or 10 pairs, evident on both surfaces, curving upward and anastomosing near the margin; reticulation of the veinlets evident above, obscure beneath. Inflorescences fasciculate, axillary, fascicles with active or abortive terminal buds, the bracts small, coriaceous, tricuspidate, ciliate at the center; flowers 4-merous. Staminate inflorescences: individual branches of the fascicles 1–7-flowered, cymose; peduncles 3–5 mm. long, the pedicels 2–3 mm. long, both glabrous, the prophylla 0–2, basal, acute; calyx patelliform, glabrous, 2.5 mm. across, shallowly 4-lobed, the lobes broadly deltoid, erose, ciliate; corolla rotate, 4.5 mm. across, the petals ovate, 2 mm. long, eciliate, one-tenth connate at the base; stamens nearly equaling the petals in length; rudimentary ovary pulvinate, shortly rostellate. Pistillate inflorescences: individual branches of the fascicles uniflorous; pedicels 5 mm. long, glabrous with 2 sub-basal ciliate acute prophylla; calyx 3.5 mm. across, 4-lobed, the lobes rounded, erose, ciliate; corolla as in the staminate flowers; staminodes one-third shorter than the petals; the sterile anthers sagittate, with apiculate apex, glabrous; ovary subglobose, styliiferous, the apical end truncate, with 4-lobed stigma. Fruits not seen.

CHINA: Fukien: Yen-ping, *H. H. Chung* 3366 (A), 3368 (TYPE, pistillate flower, A), 3576 (A); *Dunn* ex Hongkong Herb. no. 2470 (A).

The description of the staminate flowers is drawn from Dunn's collection as cited above.

Ilex fukienensis is endemic to central Fukien. There it grows as a shrub or small tree in thickets or woods at an altitude of 900 meters. Its white flowers appear in April.

The glabrous branchlets and staminodes of *Ilex fukienensis* resemble those of *Ilex elmerrilliana* S. Y. Hu, but the latter has thickly coriaceous elliptic leaves with obsolete lateral nerves, uniflorous branches of staminate fascicles, and 5–7-merous flowers. The cymose individual branches of the staminate fascicles of *Ilex fukienensis* indicate close relationship between this species and *Ilex memecylifolia* Champ. ex Benth., but the latter has pubescent branchlets and staminodes, thick-coriaceous and smaller leaves, and very short acumens. The loose staminate fascicles and caudate acuminate apex of the present species suggest close relationship with *Ilex oligodonta* Merr. & Chun, but the latter has pubescent branchlets, pubescent inflorescences, elevated midribs, and narrower leaves.

SERIES 4. MICRODONTAE (LOES.), STAT. NOV.

Ilex subgen. *Euilex*, ser. *Aquifolium*, sect. 3. *Microdontae* Loes. in Engler & Prantl, Nat. Pflanzenfam. Nachtr. 219. 1897, et in Nov. Act. Acad. Caes. Leop.-Carol. Nat. Cur. 78: 291 (Monog. Aquif. 1: 291). 1901.

Ilex etc. subsect. a. *Eumicrodontae* Loes. Il.cc.

Evergreen shrub or small tree with cinereous branchlets; leaves coriaceous or subcoriaceous, serrate or subentire, elliptic, oblong-oblong-oblanceolate or obovate-elliptic, the apex caudate or acuminate; inflorescences fasciculate, subracemose or pseudopaniculate; fruit small, globose, 3–5 mm. in diameter; pyrenes 5–7, minute, 1.5–2 mm. long, 0.5–1 mm. wide, smooth, with 1 or no stria on the dorsal surface, the endocarp coriaceous.

KEY TO THE SPECIES

- A. Pyrenes 2 mm. long, 1 mm. wide, not striate on the dorsal surface; leaves subcoriaceous, oblong-oblong-oblanceolate, 5–10 mm. long, the lower half entire, the rest subentire, the lateral nerves 10–12 pairs. (Yunnan).....108. *I. forrestii*.
 AA. Pyrenes 1.5 mm. long, 0.5 mm. wide, with a longitudinal median stria on the dorsal surface; leaves rigidly coriaceous, sharply serrate, 4–6 cm. long, the lateral nerves 8 or 8 pairs. (Upper Burma and Yunnan)....
109. *I. wardii*.

108. *Ilex forrestii* Comber in Notes Bot. Gard. Edinb. 18: 46. 1933.

Ilex corallina sensu Anon. in Notes Bot. Gard. Edinb. 14: 117. 1924, non Franch.

Ilex odorata sensu Anon. in Notes Bot. Gard. Edinb. 17: 48. 1929, non Buch.-Ham.

Ilex odorata Buch.-Ham. var. *tephrophylla* sensu Comber in Notes Bot. Gard. Edinb. 18: 61. 1933, non Loes.

An evergreen shrub or small tree up to 7 m. high with cinereous puberulent striate and longitudinally rugose branchlets, subcoriaceous oblong-oblanceolate, acuminate, subentire and weakly serrate leaves, fasciculate infructescences, small globose fruits with 5–7 smooth coriaceous pyrenes.

Branchlets subterete, rugose; second year's growth 5–6 (rarely 3.5 mm.) in diameter, longitudinally rimose, the lenticels sparse, minute, orbicular, the leaf-scars triangular, strongly elevated; current year's growth angular, 3 mm. in diameter, puberulent, the lenticels sometimes evident, narrowly elliptic, the terminal bud small, conic, puberulent. Leaves occurring also on the second year's growth, 10–15 mm. apart; stipules narrow-deltoid, acute, persistent; petioles 5–12 mm. long, one-fifteenth to one-eighth the length of the lamina, narrowly sulcate and puberulent above, when dry rugose beneath; lamina coriaceous, dark olivaceous or olivaceous, shiny above, opaque beneath, oblong-oblong-oblanceolate, elliptic, or obovate-elliptic, (5–)8–9(–11) cm. long, (1.5–)3(–3.5) cm. wide; rounded, obtuse, or very rarely cuneate at the base; acuminate at the apex, the acumen 10–15 mm. long; the lower one-third to one-half of the margin entire, the rest subentire, crenulate or serrate; midrib impressed and puberulent above, elevated beneath, the lateral nerves 10–12 pairs, obscure above, evident beneath. Inflorescences subfasciculate, axillary, subsessile, on second year's growth, the bud-scales of the inflorescences reniform, coriaceous, puberulent, the central axis up to 10 mm. long, puberulent; the bracts ovate, acute, puberulent. Staminate inflorescences: often pseudopanicu-

late, the individual branches of the pseudo-panicles 3-florous, the peduncles 3 mm. long, the pedicel 2 mm. long, puberulent, with 2 basal prophylla; flowers 4–5-merous; calyx cyathiform, 2 mm. across, deeply 4- or 5-lobed, the lobes broad-deltoid, obtuse or acute, ciliate; corolla rotate, 6 mm. across, the petals 4 or 5, oblong-obovate, ciliate, one-fifth connate at the base; stamens two-thirds the length of the petals, the anthers oblong, 0.75 mm. long; rudimentary ovary pulvinate, obtuse at the apex, inconspicuously lobed. Pistillate flowers not seen. Infructescences fasciculate or subracemose, the central axis up to 8 mm. long; pedicels 3–5 mm. long, pubescent, with 2 sub-basal prophylla. Fruit globose, 3–5 mm. in diameter, the persistent calyx 2 mm. in diameter, explanate, the stigma discoid, almost capitate, the exocarp very thin. Pyrenes 5–7, 2 mm. long, 1 mm. wide, smooth, estriate and esulcate, the endocarp coriaceous.

CHINA: Yunnan: Mekong-Salwin Divide, *G. Forrest* 14173 (A), 15047 (ISOTYPE, A), 17289 (A), 19808 (A, US); Salwin-Kiu-chiang Divide, *G. Forrest* 20093 (A); W. Li-kiang, on Yangtze bank, *K. M. Feng* 2634 (A); Chung-tien, on Yangtze bank, *K. M. Feng* 3227 (A), 3252 (A); Shang-pa-hsien, *H. T. Tsai* 54449 (A), 54459 (A); Wei-si-hsien, *H. T. Tsai* 57850 (A), 59798 (A), 59846 (A), 63097 (A); *C. W. Wang* 70416 (A).

So far as our material goes, *Ilex forrestii* is endemic and localized in a very small area at 27°30'–28°12' N. and Long. 98°56'–99°45' E., where within 60 kilometers three big Asiatic rivers, the Yangtze, the Mekong, and the Salwin run parallel. They cut through and form deep gorges among high mountain ranges of 4000–5000 m. altitude. No place in the world presents more varied topographic and climatic environmental conditions capable of affecting the life and form of plants than this area. It is there that this peculiar species occurs. It grows in thickets and mixed forests at altitudes of 2500–2800 m. as a shrub or small tree. It flowers in June or early July. Its fruits are red in October. *Forrest* 19808, collected in July, has very young fruits.

Ilex forrestii is a very interesting and very well marked species. The small fruit with five to seven minute smooth pyrenes and the leaves, in which the lower portion of the margin is entire and the upper portion subentire, are its characteristic features. In the same characters it somehow simulates *Ilex corallina* Franch., but the latter has 4 striate and sulcate pyrenes.

108a. *Ilex forrestii* var. *glabra*, var. nov.

Arbor parva; ramulis glabris, 3–4 mm. diametro; foliis ovatis, ellipticis vel oblongis, basi rotundatis vel obtusis, apice acuminatis, acuminibus 10 mm. longis, costa supra impressa et glabra; inflorescentiis fructiferis pseudoracemosis, unifloris, raro 3-floris.

CHINA: Yunnan: Wei-si-hsien, *C. W. Wang* 67743 (TYPE, A).

This variety differs from the typical species in having glabrous branchlets. It occurs in the forest of northwestern Yunnan at an altitude of 2800 m., where it grows as a tree up to 6 m. high.

109. *Ilex wardii* Merr. in *Brittonia* 4: 102. 1941.

Ilex forrestii Comber in *Notes Bot. Gard. Edinb.* 18: 46. 1933, in part.

An evergreen shrub up to 2 m. high with stout, minutely puberulent cinereous branchlets, coriaceous serrate caudate leaves, fasciculate puberulent inflorescences, 5- or 6-merous flowers, small globose fruits, and smooth, minute and longitudinally unistriate pyrenes.

Branchlets stout, longitudinally ridged and rugose, cinereous; third year's growth 4 mm. in diameter, the lenticels lacking, the leaf-scars semi-orbicular or crescent-shaped, slightly elevated; current year's growth 3 mm. in diameter, angular or subterete, sparsely puberulent, the terminal buds subglobose-conic, puberulent. Leaves occurring also on the second year's growth, 6-10 mm. apart; stipules narrow-deltoid, 1 mm. long, sometimes puberulent, persistent; petioles 5-7 mm. long, one-thirteenth to one-eighth the length of the lamina, canaliculate, pubescent above; lamina rigidly coriaceous, olivaceous, shiny above, opaque beneath, elliptic or obovate-elliptic, 2-9 (usually 4-6) cm. long, 1-3 cm. wide; rounded or obtuse and often puberulent at the base; caudate-acuminate at the apex, the acumen 10-15 mm. long, often serrate; margin sharply serrate, the teeth nigrescent-apiculate; midrib impressed and puberulent above, elevated beneath, the lateral nerves 7 or 8 pairs, obscure, rarely slightly impressed above, evident beneath, the reticulation of the veinlets obscure on both surfaces. Inflorescences fasciculate, subsessile, axillary, on second year's growth, puberulent; flowers 5- or 6-merous. Staminate inflorescences: the fascicles approaching pseudopanicles, the individual branches 3-flowered, cymose; the bracts ovate, acute, puberulent and ciliate, with 2 stipule-like subulate basal appendages; peduncles 2-3.5 mm. long, the pedicels 1.5-2 mm. long, longitudinally ridged, with 0-2 median prophylla; calyx patelliform, 2.5-3 mm. across, deeply 5- or 6-lobed, the lobes deltoid, acute, puberulent, and ciliate; corolla rotate, 5-6 mm. across, the petals oblong, 1.75-2 mm. long, erose, eciliate, one-fifth connate at the base; stamens slightly shorter than the petals, the anthers ovoid, 0.75 mm. long; rudimentary ovary pulvinate, the apex inconspicuously sulcate. Pistillate inflorescences: individual branches of the fascicles uniflorous; pedicels 3-4 mm. long; calyx as in the staminate flowers; corolla subrotate, the petals 1.75 mm. long, one-eighth connate at the base; staminodes two-thirds the length of the petals, the sterile anthers sagittate; ovary subglobose, 1.5 mm. in diameter, glabrous. Fruit globose, 3-4 mm. in diameter, the pedicels 3-4 mm. long, the persistent calyx patelliform, 3 mm. in diameter, ciliate, the stigma mammiform, the exocarp very thin, membranaceous, the mesocarp fleshy. Pyrenes 6, minute, oblong in outline, the ends obtuse, 1.5 mm. long, 0.5 mm. wide on the back, smooth, with a single longitudinal median stria on the back and along the ventral keel, the endocarp coriaceous.

CHINA: Yunnan: western Yunnan, *G. Forrest* 15624 (material for the description of the pistillate flowers, A), 17547 (material for the description of the staminate flowers, A), 18133 (A); Szemao, *A. Henry* 12597 (A, US); Mt. Lao-keau, *E. E. Maire* 312 (A).

UPPER BURMA: *F. K. Ward 9212* (TYPE, A).

Ilex wardii was first described from material collected in Upper Burma. Specimens have also been collected in western Yunnan on the western flank of the Tali Range, Lat. 25°40' N. In the latter locality it grows as a shrub in thickets at an altitude of 3000 m. The olive-yellow fragrant flowers appear in July, and the fruit becomes red in November.

In its fasciculate puberulent inflorescences, small globose fruit, and smooth coriaceous pyrenes, *Ilex wardii* is closely related to *Ilex forrestii* Comber, but the latter differs in having larger subcoriaceous, subentire leaves and larger elliptic pyrenes with pointed ends. The coriaceous serrate leaves of *Ilex wardii* also simulate those of *Ilex odorata* Ham. ex D. Don, but *Ilex wardii* has six very small smooth pyrenes. The pyrenes of *Ilex odorata* are much larger and are distinctly and palmately striate-sulcate.

SERIES 5. HANCEANAE, SER. NOV.

Frutex; ramulis pubescentibus; foliis coriaceis vel subcoriaceis, integerimis, apice obtusis retusis vel emarginatis; inflorescentiis paucifasciculatis, cymis ♂ 1-3-floris, cymis ♀ 2- vel raro 3-floris; fructuum pedicellis brevissimis, 1-2 mm. longis; fructibus parvis, 3-5 mm. diametro; pyrenis 4, striatis, esulcatis; endocarpio coriaceo.

KEY TO THE SPECIES

- A. Leaves punctate beneath. (S. China).....110. *I. championii*.
 AA. Leaves not punctate.
 B. Midrib of the leaf elevated; branchlets hirsute; apex of the leaf rounded and emarginate. (East and South China).....
 111. *I. lohfaensis*.
 BB. Midrib of the leaf plane or slightly impressed; branchlets puberulent; apex of the leaf obtuse or shortly acuminate, rarely retuse. (Hongkong).....112. *I. hanceana*.

110. *Ilex championii* Loes. in Nov. Act. Acad. Caes. Leop.-Carol. Nat. Cur. 78: 349 (Monog. Aquif. 1: 349). 1901; Merr. in Lingnan Sci. Jour. 13: 36. 1934.

Ilex memecylifolia Champ. ex Benth. var. *nummularifolia* Champ. ex Benth. in Hook. Jour. Bot. Kew Gard. Misc. 4: 329. 1852; Forbes & Hemsl. in Jour. Linn. Soc. Bot. 23: 117. 1886.

A puberulent or glabrescent shrub or tree up to 12 m. high with thickly coriaceous punctate entire leaves, obtuse or shortly acuminate or rarely rounded and retuse apex, fasciculate inflorescences, paired and very shortly pedicellate fruits and 4 striate but esulcate pyrenes.

Branchlets sparsely puberulent or glabrescent, subterete, brunneous or castaneous; third year's growth 3 mm. in diameter, longitudinally rimulose, the lenticels lacking, the leaf-scars much elevated; second year's growth 2 mm. in diameter, longitudinally ridged, glabrescent; current year's growth angular, ridged, puberulent, the terminal buds conic, acute, puberulent. Leaves occurring also on the second year's growth, 3-12 mm.

apart; stipules callose, acute, deltoid, 1 mm. long, persistent; petioles 4–5 mm. long, one-eighth to one-fourth the length of the lamina, dorso-ventrally flattened, very minutely but sparsely puberulent on the sides, shallowly and broadly canaliculate above, the distal half winged by the decurrent leaf-base; lamina thick-coriaceous, olivaceous-brunneous, smooth and slightly shiny above, opaque and punctate beneath, ovate or obovate or rarely obovate-elliptic, 2–4.5 cm. long, 1.5–2.5 cm. wide, obtuse at the base, obtuse, shortly and abruptly acuminate or rounded and usually retuse or emarginate at the apex; margin entire; midrib very slightly elevated or plane on both surfaces, very sparsely and minutely puberulent above, glabrous beneath, the lateral nerves 8–10 on each side, obscure above, evident beneath, the reticulation of the veinlets occasionally evident beneath. Inflorescences fasciculate, puberulent, axillary on the second year's growth, the bracts deltoid, pubescent, with the inner ones short and tricuspidate. Staminate inflorescences: individual branches of the flowers 1–3-flowered, when 3-flowered cymose; peduncles 1–1.5 mm. long, the pedicels 0.5–1 mm. long, with 0 or 1 minute basal obtuse prophyllum; flowers 4-merous; calyx patelliform, 1.8 mm. across, pubescent, deeply 4-lobed, the lobes rounded, ciliate; corolla rotate, 5 mm. across, the petals oblong-ovate, eciliate, one-fifth connate at the base; stamens shorter than the petals, the anthers oblong; rudimentary ovary pulvinate, shortly and abruptly rostellate. Pistillate flowers not seen. Infructescences fasciculate, the fascicles with paired fruit, the pedicel 1.5–2 mm. long, puberulent, with 2 sub-basal or median prophylla. Fruit compressed-globose, 3–4 mm. in diameter, the persistent calyx explanate, quadrangular, pubescent and ciliate; the stigma discoid, convex, 4-lobed, the exocarp very thin. Pyrenes 4, elliptic-obovoid in outline, 3.5 mm. long, 1.5 mm. wide, the dorsal surface 3-striate and esulcate, the endocarp coriaceous.

CHINA: Kweichow: Fan-ching-shan, *Steward, Chiao & Cheo 688* (A, US). Kwangtung: Hwei-yang, *W. T. Tsang 25687* (A), *25625* (A); Loh-fou-shan, *E. D. Merrill 11090* (A, NY). Kwangsi: Yao-shan, *C. Wang 39515* (A), *39533* (A), *40064* (A). Hongkong: *Champion* (fragments of the TYPE, A).

Ilex championii was discovered in Hongkong and first interpreted as a variety of *Ilex memecylifolia* Champ. But it differs from the latter species in having very shortly pedicellate fruits, retuse apices, and punctate leaves. Specimens that match well fragments of Champion's collection have been obtained from Kweichow, Kwangsi, and Kwangtung. In Kwangsi the plant grows as a tree up to 12 m. high in mixed woods on rocky hilltops. The white flowers appear in June and in October the fruit becomes red.

The paucifasciculate inflorescences, shortly pedicellate small fruits, and the four striate-esulcate pyrenes of *Ilex championii* indicate its close relationship with *Ilex lohjauensis* Merr., but the latter has pilose branchlets and smaller, thinly coriaceous leaves with epunctate lower surfaces.

W. T. Tsang 25625 has crenate leaves. It was probably collected from a young, vigorously growing shoot.

111. *Ilex lohfauiensis* Merr. in Philipp. Jour. Sci. Bot. 13: 144. 1918;
H. H. Hu and Tang in Bull. Fan Mem. Inst. Biol. Bot. 9: 250. 1940.

Ilex hanccana Maxim. var. *anhweiensis* Loes. ex Rehd. in Jour. Arnold Arb. 8: 156. 1927.

Ilex hanccana Maxim. var. *lohfauiensis* (Merr.) Chun in Sunyats. 1: 261. 1934.

A pubescent evergreen shrub up to 2 m. high with thick-pubescent branchlets, oblong (rarely obcordate) entire leaves with the apex hairy and emarginate, fasciculate inflorescences, short-pedicellate, usually paired fruit, and 4 striate-esulcate pyrenes.

Branchlets slender, densely pubescent, dark castaneous, the lenticels lacking; third year's growth 2 mm. in diameter, longitudinally plicate-rugose, densely pubescent; second year's growth 1.2 mm. in diameter, pilose; current year's growth less than 1 mm. in diameter, the terminal buds thin-conic, pilose. Leaves occurring even on the third year's growth, 3-8 mm. apart; stipules narrowly deltoid, 1 mm. long, subulate, acute, pilose; petioles 1-2 mm. long, one-fifteenth to one-tenth the length of the lamina, pilose, plane or shallowly canaliculate above, winged by the decurrent leaf-base; lamina thin-coriaceous or chartaceous, brunneous or olivaceous-brunneous on both surfaces, slightly shiny above, opaque beneath, oblong, rarely rhomboid or obcordate, 1-2.5 cm. long, 5-12 mm. wide; cuneate or rounded and pubescent at the base; retuse, emarginate, or even obcordate and ciliate at the apex; margin entire, often ciliate; midrib elevated and hirsute above, plane beneath, pilose on both surfaces, the lateral nerves 6-8 pairs, obscure on both surfaces. Inflorescences fasciculate, axillary on second year's growth, the bracts deltoid, pilose. Staminate inflorescences: individual branches of the fascicles 1-3-flowered; peduncles 1 mm. long, the pedicels 1 mm. long or less, pilose; flowers 4- rarely 5-merous; calyx patelliform, 1.5 mm. across, pubescent, shallowly 4-lobed, the lobes rounded, erose, ciliate; corolla rotate, 4.5 mm. across, the petals 4 or 5, broad-elliptic, eciliate, one-fifth connate at the base; stamens one-half the length of the petals, the anthers oblong, 0.8 mm. long; rudimentary ovary pulvinate, shortly rostellate. Pistillate inflorescences: fascicles with 2 or rarely 3 flowers, the individual branches uniflorous; pedicels 1 mm. long, with 2 supermedian prophylla; calyx and corolla as in the staminate flowers. Staminodes three-fourths the length of the petals, the sterile anthers cordate; the ovary globose-ovoid, 0.75 mm. in diameter, the stigma discoid, convex, lobed, the style evident. Fruit globose, 3.5 mm. in diameter, brunneous, the exocarp very thin, the stigma 4- or rarely 5-lobed, discoid. Pyrenes 4, broad-elliptic in outline, trigonous in cross-section, smooth, 3 mm. long, 2 mm. wide, the ends acute, the dorsal surface 3-striate-esulcate, the sides and the ventral keel each with a single stria, the endocarp coriaceous.

CHINA: Anhwei: Chimen, R. C. Ching 3109 (ISOTYPE of *Ilex hanccana* var. *anhweiensis*, A). Chekiang: Hsuen-hsien, R. C. Ching 2075 (A, US); Shih-men, R. C. Ching 2173 (A, LU, US). Kiangsi: Hong-san, J. L. Gressitt 960 (A); Kien-nan, S. K. Lau 3946 (A, US); Lung-nan,

S. K. Lau 4749 (A, US), 4796 (A, US). Kwangtung: Loh-fau Mt., *E. D. Merrill* 10678 (ISOTYPE, A, NY), *C. O. Levine* (CCC 1455) (A, US); Wung-yuen, *S. K. Lau* 2371 (A), 2629 (A); Sin-fung, *Y. W. Taam* 889 (A), 937 (A); Loh-ch'ang, *W. T. Tsang* 20770 (A, NY), 20884 (A, NY, US); Ta-pu, *W. T. Tsang* 21049 (A, NY); Lung-men, *W. T. Tsang* 25396 (A). Kwangsi: Wai-tsap-hsien, *W. T. Tsang* 22777 (A); Yao-shan, *C. Wang* 40660 (A).

Ilex lohfaucensis is common in the warm temperate and subtropic southeastern area of China, where it grows as an evergreen shrub in woods or thickets at altitudes of 200–600 m. At the center of its distribution the flowers appear in June, but at the northern limit of its range the flowers are found in August. The fruit becomes red in December.

In its thin-coriaceous leaves, paucifasciculate inflorescences, paired and shortly pedicellate fruits and striate-esulcate pyrenes *Ilex lohfaucensis* is very closely related to *Ilex hanceana* Maxim., but the latter has puberulous branchlets and elliptic or obovate leaves with short-acuminate or obtuse or rarely rounded and retuse apices, and plane or slightly impressed midribs.

112. *Ilex hanceana* Maxim. in *Mém. Acad. Sci. St. Pétersb.* VII, 29(3): 33. 1881; Forbes & Hemsl. in *Jour. Linn. Soc. Bot.* 23: 116. 1886; Loes. in *Nov. Act. Acad. Caes. Leop.-Carol. Nat. Cur.* 78: 203, *pl.* 7, *fig.* 1 (*Monog. Aquif.* 1: 203). 1901; Dunn & Tutcher in *Kew Bull. Misc. Inf. Add. Ser.* 10: 59. 1912.

Ilex buxifolia Hance in *Jour. Bot.* 14: 364. 1876, non Gardn. 1845.

An evergreen shrub with puberulent slender branchlets, obovate or obovate-oblong leaves, paucifasciculate inflorescences, very short puberulent pedicels, ciliate rounded calyx-lobes, small globose fruits (usually in pairs), and 4 striate-esulcate pyrenes.

Branchlets pubescent, castaneous; third year's growth 2 mm. in diameter, pubescent, plicate-rugose, the lenticels lacking, the leaf-scars crescent-shaped, elevated; second year's growth 1.5 mm. in diameter, densely pubescent, longitudinally ridged; current year's growth 1 mm. in diameter, longitudinally ridged and canaliculate, the terminal buds conic, acute, pubescent. Leaves occurring even on the third year's growth, 2–8 mm. apart; stipules deltoid, callose, acute, persistent; petioles 2–5 mm. long, one-thirteenth to one-seventh the length of the lamina, pubescent, plane or broadly but shallowly canaliculate above; lamina thinly coriaceous, brunnous or olivaceous-brunnous, slightly shiny above, opaque beneath, obovate or obovate-oblong, 3.5 cm. long, 1–2 cm. wide; obtuse or cuneate, pubescent at the base; very shortly and abruptly acuminate or obtuse or rounded or very rarely retuse at the apex; margin entire; midrib plane or slightly impressed and puberulous above, elevated and glabrous beneath, the lateral nerves 6 or 7 pairs, obscure on both surfaces. Inflorescences pauci-fasciculate, pubescent, axillary on second year's growth with active or dormant terminal buds; the bracts deltoid, pubescent. Staminate inflorescences: individual branches of the fascicles 2–3-flowered; peduncles

1–2 mm. long, the pedicels 1–1.5 mm. long, with 1 or 2 basal prophylla; flowers 4-merous; calyx patelliform, 2 mm. across, pubescent, shallowly 4-lobed, the lobes rounded, ciliate; corolla rotate, 3 mm. across, the petals ovate, eciliate, one-fourth connate at the base; stamens shorter than the petals; rudimentary ovary conic, the center depressed. Pistillate inflorescences: individual branches of the fascicles uniflorous, the bracts tricuspidate, acute, pubescent; pedicels 1.5 mm. long, pubescent, with 2 basal lanceolate prophylla 0.75 mm. long; calyx and corolla as in the staminate flowers; staminode three-fourths as long as the petals, the sterile anthers cordate; ovary subglobose-ovoid, 1.25 mm. in diameter, glabrous, the stigma broadly discoid, 0.75 mm. in diameter. Fruit globose, 5 mm. in diameter, brownish red, shiny, the persistent calyx explanate, quadrangular, pubescent, and ciliate, the stigma very thinly discoid, 4- or 5-lobed. Pyrenes 4, broad-elliptic in outline, 4 mm. long, 3 mm. wide, the dorsal surface longitudinally striate, with the vascular bundles branched, not anastomosing, elevated, and clinging to the smooth esulcate coriaceous endocarp.

CHINA: Hongkong: Happy Valley, *J. Lamont 1101* (TYPE, photo, A); Mt. Victoria, *W. J. Tutcher* (ex Herb. Hongkong no. 4569, material for the description of the pistillate flower, A); Mt. Kellet South, *W. J. Tutcher* (ex Herb. Hongkong no. 10065, material for the description of fruits, A).

The above description is drawn from topotypic material. It agrees with Hance's original description in: (1) chartaceous, obovate or elliptic-ovate, obtuse, entire leaves; (2) short-pedicellate (2 mm. long), 4-merous flowers, obtuse and ciliate calyx; and (3) stamens shorter than the petals. It differs from Hance's description in: (1) apex of the leaf not pronouncedly emarginate; (2) branchlets not glabrous; and (3) leaves not quite matching the size as given by Hance. Hance's description was drawn from a specimen collected by *J. Lamont* (Hance Herb. no. 19344). It seems that since then no one working on the Chinese *Ilex* has seen the type. Neither Maximowicz nor Loesener saw it. The latter drew his description from *Ford 382* and from a Liu-kiu specimen, the identity of which he doubted. His illustration is very misleading. The Liu-kiu specimen is not the Hance species. Its petioles and pedicels are far too long to fit Hance's description.

Ilex hanceana Maxim. is localized in Hongkong. With our ample collections from Kwangtung, there is only one specimen from Loh-fau-shan that matches the topotypes to some degree. In Hongkong, the plant grows as a shrub, where it flowers in May. Its fruits become red in December.

Ilex hanceana is closely related to *Ilex lohfauiensis* Merr., but the latter species has hirsute branchlets, oblong leaves with a rounded and emarginate apex, and a distinctly elevated hirsute midrib.

DOUBTFUL AND EXCLUDED SPECIES

ILEX LEPTOCANTHA Lindl. & Paxt. in *Fl. Gard.* 3: 72. 1852; Maxim. in *Mém. Acad. Sci. St. Pétersb.* VII, 29(3): 44. 1881; Forbes & Hemsl. in *Jour. Linn. Soc. Bot.* 23: 117. 1886.

The description, "foliis ovali-oblongis acuminatis . . . spinoso-dentatis-dentibus gracilibus.", was based on a sterile specimen. The authors also noted, "the leaves being six inches long by two inches wide," and it was from "the North of China", probably Shanghai or Mingpo. It is probably a juvenile form of *Ilex latifolia* Thunb. or of *Ilex cornuta* Lindl. & Paxt.

ILEX MYRIADENIA Hance in Jour. Bot. **21**: 296. 1883; Forbes & Hemsl. in Jour. Linn. Soc. Bot. **23**: 117. 1886; Dunn & Tutcher in Kew Bull. Add. Ser. **10**: 60. 1912.

Loesener disposed of this as *Ilex purpurea* Hassk. var. *myriadenia* (Hance) Loes. (= *Ilex chinensis* Sims) but the leaves of the latter species are not glandular as Hance stated, "subtus opacis et confertissime glandulosis."

ILEX RACEMOSA Oliv. in Hook. Ic. Pl. **19**: pl. 1863. 1889.

This binomial is based upon *A. Henry* 1863, 3527, 4117A and 7189. It is a species of *Perrottetia* (Celastraceae).

ILEX REEVESIANA Fortune in Gard. Chron. **1851**: 5. 1851.

Forbes and Hemsley placed this as a doubtful synonym of *Ilex fortunei* Lindl. & Paxt. The description is unsatisfactory and the type specimen is apparently not extant. From Fortune's statement "flowers on short spikes, terminal", it is obvious that no *Ilex* is represented.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

UNLISTED TECHNICAL PLANT NAMES IN THE PUBLISHED
WORKS OF L. OKEN (1841) AND J. S. PRESL (1846)

E. D. MERRILL

RECENTLY Doctor I. M. Johnston called my attention to a few unlisted boraginaceous binomials published by J. S. Presl¹ in 1846. A casual examination of some of the entries in Presl's Czech text indicated that there were other scattered but as yet unlisted new binomials in both volumes. What intrigued me most, however, were still other unlisted binomials credited by Presl to Oken. The latter was known to me only as a zoologist and as the editor of *Isis*, not as an author of systematic botanical texts. In the second edition of Pritzel's *Thesaurus* (1872-77) there is no entry under Oken, but in the first edition of that standard work (1857) is this item: "Oken, Lorenz. Allgemeine Naturgeschichte für alle Stände. Band 2 und 3 oder Botanik, Band 1 und 2. Stuttgart, Hoffmann. 1839-1841. 8.-I: 1839. iv, 386 p.-II: 1841. 2135, xxx, 44 p. (2½ *th.*) Atlas in 4: 8 tab. col. cum explicatione."

This proved to be the work that I sought, for in it Oken did publish for the first time many new binomials. All of these have apparently been overlooked by all subsequent botanists other than J. S. Presl, who, a few years later properly credited certain of them to Oken. The "Zweyter Band" of the entire work is also indicated as "Botanik, erste Band" but this being an explanatory botanical text is not pertinent to the subject of this paper. The three parts which form the third volume of the entire work are also indicated as "Botanik, Zweyten Banded," with the "erste," "zweyten," and "dritte" parts (Abtheilungen), but the pagination is continuous. Here is a botanical work with over 2100 pages, the above parts published in 1841, devoted to a selected descriptive world flora, many of the really significant genera being included, as well as several thousand species; and each admitted genus and species is accompanied by a German description. In addition eight of the 164 colored plates in the atlas (Abbildungen) published in 1843 appertain to plants, while all of the plant names are included in the Universal Register, 1-468. 1842. Band I (1839) covers mineralogy and geology, and in Band IV-VII (1833-1838) the animal kingdom is considered. In all, there are thirteen volumes of text and one of plates.

Considering that in this long overlooked work there is so much that is

¹Presl, J. S. Wseobecny Rostlinopis, cili: popsani rostlin we wselikem ohledu uzitecnych a skodliwych. 1: i-xxxii. 1-1006; 2: 1007-2072 [1-2]. 1846. An approximate English translation of this Czech title is: Universal Botany, or Descriptions of Plants from all Parts of the World, Especially of Useful and Harmful Species.

strictly botanical, including certain new binomials, it impresses one as rather strange that Pritzel, or Jessen who edited the second edition of the *Thesaurus*, should have eliminated the title entirely. In the second edition, however, a very considerable number of titles that had appeared in the first edition, were eliminated, a procedure that B. Daydon Jackson later justifiably criticized. It was perhaps this elimination of the Oken title that caused this extensive work to be overlooked by most subsequent botanical bibliographers.

The unlisted Oken and Presl binomials are considered below. In preparing the list I have checked only those entries that appear in the parts devoted to a consideration of the vascular cryptogams and the spermatophytes. I naturally did not check all of the entries, but rather only those which impressed me as representing probable or possible new names; hence, it is possible that a few may have been overlooked. In no case did Oken indicate that a name accepted by him was a new one, nor did he cite authorities for any of the binomials. His usual procedure was to give, at the end of the individual descriptions, one or more references to the works of earlier authors who had considered the species, particularly those who had published illustrations; but here he normally did not cite either the binomial or the pre-Linnaean descriptive phrases used by this or that author, referring merely to the author, title, and page or illustration.

The generic and specific entries are not always easy to detect, for there is no typographical differentiation as between the scientific names and the descriptive text, except that the binomials are in Roman and the descriptions are in Gothic type. In most cases a single generic name appears, such as *Arundo*, *Carex*, *Thapsia*, etc. However, in many cases he included, following his accepted generic name, one or more synonyms, such as "Dipteryx, Baryosma," "Stilago, Antidesma," "Peumus, Ruizia, Boldua" and even in a few cases such a formula as "Cupania, Trigonía, Molinaea, Gelonium, Vouarana, Stadmannia," this last one to take only three selected species that he considered under the first name, *Cupania*. It was his rule to indicate the accepted binomial under the first generic name given, when two or more of the latter appeared.

He adopted the same general procedure in his binomials, such as the entry under "Smegmaria, Quillaja" which is "S. emarginata [Willd.], saponaria"; here the "saponaria" is understood to be a part of the binomial *Quillaja saponaria* [Molina], not a new name under *Smegmaria*. Under *Menispermum* one notes "M. cocculus [Linn.], suberosum" [= *Anamirtus cocculus* (Linn.) Wight and Arn.], the "suberosum" in this case being almost certainly derived from *Cocculus suberosus* DC. = *Anamirta cocculus* (Linn.) Wight and Arn. If one wishes to quibble one might argue that the change in the case ending of "suberosus" to "suberosum" might indicate a binomial under *Menispermum*; I do not so interpret such few cases.

I have not listed such binomials as *Lonchocarpus scandens*, *Parkia biglobosa*, *Rhizobolus glaber*, as having been published by Oken in 1841, for